

Concordia University
Department of Electrical and Computer Engineering
ELEC363: Fundamentals of Telecommunication Systems
Midterm Exam
Winter 2009

1) The function $g(t)$ has the Fourier Transform $G(\omega)$ shown in Figure 1.

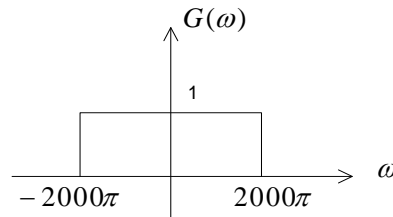


Figure 1

- a) Find and plot $g(t)$ (3 Marks).
- b) Find the Fourier Transform of $g(t) \cos(6000\pi t)$ (5 Marks).

2) Consider the baseband signal,

$$m(t) = 10 \cos(2000\pi t) + 6 \cos(4000\pi t) .$$

- a) Sketch the spectrum of $m(t)$, i.e., $M(\omega)$ (2 Marks),
- b) Find the spectrum of $x(t)$ and $y(t)$ (5 marks).

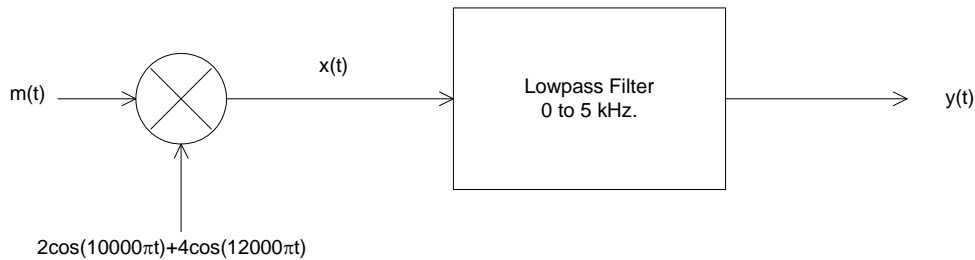


Figure 3

3) Assume that the range of frequencies assigned to an AM broadcasting service is from 650 kHz. To 1650 kHz. and each station is assigned a bandwidth of 10 kHz.,

- a) find the maximum number of stations possible (1 Mark),
- b) if the IF frequency is 550 kHz. find the frequency range of the local oscillator (3 Marks),
- c) Find the image station for the station transmitting at 1210 kHz. (1 Mark).

4) An angle modulated signal with the carrier frequency $\omega_c = 2\pi \times 10^5$ is described by

$$\phi_{FM} = 5 \cos[\omega_c t + 10 \sin(2000\pi t)] .$$

- a) Find the power of the modulated signal (1 Mark).
- b) Find the frequency deviation Δf (2 Marks).
- c) Estimate the bandwidth of $\phi_{FM}(t)$ (2 Marks).